

REPORT

OF A COMMITTEE OF THE

10

HOUSE OF REPRESENTATIVES

RECOMMENDING AN APPROPRIATION BY THE LEGISLATURE TO MAKE A

GEOLOGICAL SURVEY

OF THE

S T A T E ,

UNDER THE DIRECTION OF THE

Geological Society of Pennsylvania.

.....

Mr. SAY, Chairman.

...

READ MARCH 23, 1833.

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HARRISBURG:

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1833.

REPORT, &c.

The committee appointed on the memorial of Peter A. Brown,
REPORT:

That the memorialist proposes to make a Topographical, Geological, and Mineralogical Survey of the State, to publish a complete series of Geological maps, profiles, and sections; and to form scientific collections, to be deposited in seminaries of learning, and other places, where they can best subserve the purposes of instruction and practical usefulness, in aid of which the state is asked to subscribe for one thousand copies of the maps or atlas, which will be divided into twenty-seven numbers each, at one dollar a number, amounting to the sum of twenty-seven thousand dollars; and he also proffers to place at the disposal of the Legislature a complete cabinet of specimens of all the rocks, fossils, and minerals that shall be found in Pennsylvania, while making the survey, and a scientific report of the same.

Your committee have examined the various petitions referred to them from several counties in the state, from the Cabinet of Natural Science of Lancaster; the Cabinet of Natural Science of Montgomery county; and the Geological Society of Pennsylvania.

Fully aware of the importance of the subject, which, if properly conducted, would bring to light many mineral, and metallic deposits; developing extensive sources of wealth; promoting public and individual prosperity, the benefits of the community, and the interests of science—your committee has given considerable attention to the object of their appointment; and believing a proper execution of the survey would require the industry, talents, and persevering exertions of various individuals, application was made to the Geological Society of Pennsylvania, (of which your memorialist is a very active and efficient member, and the corresponding secretary,) stating the belief that it would be inexpedient to place in the hands of any individual, the direction of a subject of so much importance, extensive and various duties, and enquiring whether the society would find it consonant with their views to undertake the direction and responsibility of the survey.

By a communication from a committee on the part of the Geological Society, herewith presented, it is gratifying to find the society is "willing to undertake the superintendence of the survey alluded to."

"That they will receive and assume the responsibility for the faithful application of any sum of money granted by the Legislature for the said survey."

They name, in addition to the objects proposed to be effected by the contemplated measure, to establish accurately three meri-

dian or transit lines, extending entirely across the state, to be denominated the eastern, the middle, and the western meridians of the state, measured with the utmost care and precision, and permanently marked at intervals of a mile, or oftener, on suitable posts or stones, set for that purpose. Measurements of the elevation above mean tide carefully marked, and the latitude of each line precisely determined by a series of astronomical observations. Also, another line traversing the state longitudinally, which would intersect nearly every variety of rock which exists in our state, and afford important connections with the primitive meridians.

Thus the state will be prepared for Geological and Mineralogical researches and observations, and permanent land marks will be fixed, rendering comparatively light and entirely certain, the duties of surveyors, and preventing a most fruitful source of litigation.

The progress of the investigation would be slow and laborious: There are many natural difficulties to be overcome in parts of the country, where the surface is obscured with a dense forest vegetation, untamed and untrodden by man; where neither artificial excavations, or natural sections, enable a free examination of the rock and soil. The mineral and fossil productions have, as yet, been but imperfectly ascertained; and there is no branch of science calculated to draw after it more important uses, than that which aims at obtaining a true knowledge of the soil and the treasures it contains:—"If knowledge is power, so also is wealth."

Few can doubt the propriety, nay, the necessity of Pennsylvania instituting the proposed survey. Minerals extensively used in the arts, and heretofore imported either from foreigners or from our sister states, will undoubtedly be discovered in abundance for our own consumption and for exportation.

It is the opinion of an eminent Geologist and Mineralogist,* whose character and opportunities of information render his statements high authority, that "limestone, iron, coal and manures support the greatest part of the canals in England."

It is but reasonable to believe that great advantage will be derived by developing the existence of those articles, which, by their transportation, will add to the resources of the commonwealth, in passing from one part to another, and bring into use tracts of country at present comparatively of little value.

Pennsylvania will not be the first state to undertake a full development of her internal resources: a younger sister, Tennessee, has already commenced, and under the skilful and indefatigable researches and observations of Dr. G. Troost, a man well known for his Geological acquirements, she has commenced an examination of her territory, and already have numerous errors been detected in the recorded opinions of those, who, upon slight observation or information, have given a description of the formation of that state.

*Wm. M'Clure:

Massachusetts, Tennessee and South Carolina have also provided for an accurate examination of their respective states.

The knowledge of our globe has enlisted the assiduous attentions and persevering researches of devotees for years, with great benefit and edification to mankind: May not Pennsylvania add her mite to the general stock? The last and present century has been marked by a great increase of information. At public and private expense, travels have been undertaken; mountains ascended, before considered inaccessible; their position, their constituent parts investigated. Lakes and rivers have been searched, and their locations marked; but still, though great progress has been made, human knowledge is much in the dark.

Pennsylvania possesses more mineral riches than any portion of our Union. There is every variety of formation—causing her geology to be peculiarly interesting;—a very extensive variety of minerals, also, present themselves in great abundance: Iron, the most valuable of all metals; copper, lead, zinc, coal anthracite and bituminous; salt, clays, slate, and a variety of the best and most beautiful building materials. It is well known these all occur in their various assigned positions, and it is reasonable to conclude but a small portion of them have, as yet, been observed, either by the husbandman, the artist, or the scientific. To make these minute discoveries; to expose the hidden treasures which are so bountifully deposited and extensively distributed; give a general knowledge of the various formations—the Geological series—the Mineralogical varieties, by printed descriptions, public collections, and Geological maps, will unquestionably redound to the credit of the state, and richly repay any expenditure in its attainment.

Much benefit would be derived by the community, and credit to the engineer, who would, while running lines for canals, rail roads, &c. give even a slight scientific view of the country over which he passes. It is much to be wished that the General Government would establish at the National Academy a special department; for communicating such information, and qualifying the future defenders of the country to scientifically describe those regions they pass over, and for the defence of which they have devoted so much time and study. An expenditure for a thorough development of the natural productions, and the exploration of the soil, will conduce to the prosperity of the state, and be performing a duty, especially beneficial to every farmer in the country, and in which, every citizen, directly or indirectly, is interested. The value of lands will be advanced; the system of internal improvement much benefitted; the agricultural and manufacturing interests essentially promoted, and the whole commonwealth greatly enriched.

It is an indisputable fact that iron, coal, and salt, are, next to the primary articles of food and raiment, the most important and valuable productions of the earth. In Pennsylvania we have an abundant and most extensive supply, more so than any other state in

the Union; and the examination in question will, in a great measure, reveal their local positions; exhibit the immensity of their value; and thus develope prominent sources of wealth to the state.

The benefits that will result in presenting new objects of industry, and the additions to the general stock of knowledge, by its skilful accomplishment, will be of lasting value. Judicious locations for manufactories will be designated by the abundance and convenience of their various requisites, these being absolutely necessary, and of primary importance to their ultimate success.

The eventual expense to the state, will be materially reduced by the sale of maps derived by a correct execution of the survey, and probably be sufficient to repay the whole cost. The great collections of Geological and Mineralogical specimens will be of permanent value, disclosing those metals, earths and combustibles indispensably necessary for use, in the various manufactures and arts, and finishing books of study, as it were, for the enquiring mind to examine and become familiar with.

In recommending the Geological Society of Pennsylvania, which is a corporate body, as the proper medium for directing the executions of the plan suggested, the committee cannot forbear mentioning that the most judicious application of the funds for the prosecution of this great work, will be best secured by the very highly respectable and talented officers of the society, at the head of whom stands the Chief Justice of the state, who is warmly interested in the faithful execution of the proposed undertaking.

A communication from the society to your committee, stating more fully some of their views, is herewith presented—also, a bill authorising an appropriation of five thousand dollars a year, for three years:

Philadelphia, January 20, 1833.

To Benjamin Say, Esq.

SIR:—In answer to your favour of the 7th instant, requesting to be informed “whether it would be consonant with the views of the Geological Society of Pennsylvania, to undertake the direction and responsibility of a Geological and Topographical survey of the state of Pennsylvania, and if so the plan and terms on which they would expect the state to take part.”

The undersigned committee on the part of the Geological Society, beg leave to state, 1st, that the society are willing to undertake the superintendence of the survey alluded to.

2dly, They will receive and assume the responsibility for the faithful application of any sum of money granted by the legislature for the said survey.

3dly, As regards the *plan* of a survey—In addition to the views already embodied in their memorial, they offer the following outline for consideration.

In addition to the objects proposed to be effected by the contemplated Geological survey, one of the most important is the

survey and establishment of three meridian or transit lines, extending entirely across the state, to be denominated the Eastern, the Middle, and the Western Meridians of the state. Their respective localities may be approximately fixed as follow, viz: The Eastern Meridian to commence at or near the north east corner of the state of Maryland, and thence proceed due north through Chester, Berks, Lehigh, Northampton, Luzerne and Susquehanna counties, passing near Coatesville, Birdsborough, Reading, Kutztown, Linville, Mauch Chunk, Stoddertsville, and Wilkesbarre, to the northern boundary of the state, near the Great Bend of the Susquehanna.

The Middle Meridian to commence near Hancock, and proceed thence through Bedford, Huntingdon, Centre, Clearfield, Lycoming and Potter counties, crossing obliquely the following mountain ridges, viz: Town Raystown, Broad Top, Tuscarora, Brush, Bald Eagle and Allegheny mountains, also extensive elevated table lands connected with the Allegheny range, and passing in the vicinity of Stonerstown, Williamsburg, Huntingdon, Alexandria, Birmingham, Phillipsburg, Karthouse, Emporium, Coudersport and Port Allegheny, to the north boundary of the state.

The Western Meridian to commence near the point where the Monongahela river is intersected by the south boundary of the state, and to proceed thence through Greene, Fayette, Washington, Allegheny, Butler, Venango, Crawford and Erie counties, to the shore of Lake Erie, passing near Greensburg, Newport, Greenfield, Brownsville, Bentleysville, Pittsburg, Butler, Franklin, Meadville and Erie.

The manner in which it is proposed to run these Meridians is as follows:—Their true direction must be ascertained by means of a transit or other Astronomical instruments, in order that they may be located in exact coincidence with a true Meridian; the magnetic variation being too uncertain, and too liable to be influenced by local attraction to be depended upon as a guide in tracing such a meridian. The distances on each line should be measured with the utmost care and precision, and permanently marked at intervals of a mile, or oftener:—or, if deemed preferable, the latitude may be designated, in degrees and minutes, on suitable posts or stones set for that purpose, corresponding to each minute of the distance, beginning with the latitude, as determined by careful observation, at the commencement of each meridian. Each line should also be traced by a levelling instrument, and the elevation above mean tide carefully marked on stones, or benches prepared for that purpose, and set at every depression, or valley, and at every summit of a hill, ridge, or mountain, as they occur on the line.

The relative longitude of each line should also be determined with the utmost precision by means of a series of Astronomical observations made for that purpose.

The advantages expected to result from an establishment of lines of this description, are quite as numerous as they are important. Among them may be enumerated the facility of determining the true magnetic variation, at any time, by comparing the magnetic meridian with either of the meridians thus established.

The importance of this consideration will be duly appreciated by all who are conversant with the difficulties incident to the retracing of old surveys, which were made at a time when the magnetic variation was greater or less than when the retrace was made: And when the peculiarities of the magnetic needle, with respect to its annual variation, its diurnal variation, its local attraction, and its changes of variation for different meridians, are taken into consideration, the importance of fixed meridians, as bases of reference for surveys, becomes the more striking.

These meridians, when viewed in connection with the future operations of the state in furtherance of internal improvements, are worthy of particular attention. The survey and location of routes either for canals or rail roads, may readily be referred to, and connected with some point on one of the meridians whereby its altitude above tide, and its relative altitude when compared with other points more or less remote, may be easily and correctly inferred.

Moreover, the latitude and longitude of places or points intermediate to the fixed meridians, or in the vicinity of either of them, may be ascertained with sufficient precision by tracing a line from some established point in the meridian to the place whose latitude and longitude are required.

The most important of the meridians above proposed, the survey of which should be first undertaken, is that denominated the *Middle Meridian*. This meridian will traverse some of the most elevated ridges by which the state is intersected, and will lead through a portion of the state, the mineral resources of which are believed to be immensely valuable, although they have as yet been very imperfectly developed. The aspect of the country over which it will pass is probably more variegated than that of any other portion. Commencing in the valley of the Potomac, it passes thence into the basin of the Susquehanna, and thence into the region drained by the Allegheny river, one of the main tributaries of the Ohio.

In addition to the meridians just mentioned, a line traversing the state longitudinally, should be run; such a line viewed in reference to *Geological* investigations, is, if possible of more importance than any other: it would intersect in its course nearly every variety of rocks which exist in our state, and would afford important connexions with the primitive Meridians. The importance of such a line will be rendered more apparent by a few brief remarks upon its transit over the state. Commencing on the right bank of the Delaware, near Holmesburg, it would pass in its course near the villages of Holmesburg and Germantown, in approaching the latter

place the line will have attained an elevation, by an almost imperceptible ascent, of nearly 300 feet. Leaving Germantown it would again descend into the valley of the Wissahickon creek, which, geologically considered, deserves especial notice: still progressing westward, the line would descend to nearly the level of tide water on reaching the Schuylkill near Manayunk; crossing the Schuylkill at Manayunk and pursuing its westward course through an exceedingly rugged country, the line enters the valley of Mill creek, ascending the dividing ridge which separates the waters of Schuylkill from those of Darby creek, it would enter the towns of Lower Merion, Radnor, Tridaffron, &c.

Thus far the line will have extended about 20 miles from its point of outset on the Delaware. This region, though exceedingly interesting in itself, is perhaps less promising in regard to Geological riches than that upon which the proposed line is now about to enter. From Radnor the line would pass into the valley of Chester, leaving Paoli and Downingtown to the left, and thence crossing the large branches of Brandywine creek, would enter the eastern confines of Lancaster county at the base of Mine ridge, and ascend the south west spur of Welch mountain, a distance, by horizontal measurement, of 52 miles from the point of departure. The Susquehanna would be crossed by the proposed line, which pursuing its way over Lancaster county, and through or near the village of Intercourse, and city of Lancaster, and thence into York and Cumberland counties, by Columbia, Liverpool, Rosstown and Shippensburg, the line would enter into what may with strict propriety be denominated the mountain region of Pennsylvania. Now commences that gradual elevation of surface which ultimately attains a mean altitude of 2500 feet above tide water. At Shippensburg the line will have extended about 135 miles from the Delaware. The structure of this section of the state requires a more minute description than has yet been devoted to it. Five miles west of Shippensburg, after crossing the southern spur of Shade mountain, the Little Aughwick creek is intersected, thence to the summit of Sideling hill, is six miles, thence to the Great Broad Top mountain, (where the line will intersect the central meridian,) seven miles. Two miles further, by a precipitous course, the Raystown branch of the Juniata is passed, and thence to the great Allegheny mountain or main ridge of the system, twenty-three miles; passing in its progress Tussey's, Dunning and Chesnut mountains. Descending into the valley of the Kiskiminetas the line will pursue its course westward through Somerset, Westmoreland, Fayette and Washington counties, and passing near to or through the town of Stoystown, Perryopolis, Greenfield and several others, will terminate on the western boundary of the state near the town of West Alexandria.

The state thus intersected will be properly prepared for more detailed operations, which by judicious measures of this sort in the commencement, the entire geological survey would be reduced to the most simple principles, and the whole conducted in a man-

ner conducive to satisfactory results. The importance of bases, or check lines, with which it is proposed to commence the contemplated survey, will be readily understood by those who are familiar with the errors which abound in our state map, in common with all others constructed without regard for that unity of action on the part of the local land surveyors, which is indispensable, and which cannot be attained unless guided and restrained by standard lines, such as those just mentioned; by the aid of such lines, by which the magnetic variation may be readily inferred for any point in their vicinity, the duties of the surveyor would be rendered comparatively light, and the survey carried on either immediately or at any future period, as the Legislature might see occasion. The intersecting lines, however, as they must form the basis of all future operations, should be entered on immediately, and thus establish those land marks, the absence of which has hitherto tended to vitiate our local surveys, and to create for individuals a fruitful source of litigation for years to come.

In conclusion, the committee beg leave to state that it is not, in their opinion, necessary at present, to enter into detailed observations relative to the Geological riches of regions as yet unexplored; but at the same time, it is well known that *almost every variety of metalliferous rocks*, which in Europe have yielded for centuries such immense revenues, do exist in the state of Pennsylvania.

Gentlemen of the highest scientific reputation, and possessing the confidence of the Geological society, and the public esteem, have offered their services for the performance of the contemplated survey under the direction of the society.

Signed,

JOHN B. GIBSON,
RICHARD HARLAN,
HENRY S. TANNER,
Committee.

An act providing for a Geological survey of the state.

Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania, in General Assembly met, and it is hereby enacted by the authority of the same, That if the Geological society of Pennsylvania, shall, within 60 days after the passage of this act, engage, by writing, under their corporate seal, to take upon themselves the duty of causing to be accurately located and designated at least three meridian lines, crossing this state, and one other line at right angles therewith, extending through the state, and shall in like manner engage to conduct a Geological and Topographical survey of the state, and to furnish for the use of the state copies of the map, profiles and sections of such survey: in such case the Governor be and he is hereby directed to draw his warrant on the State Treasurer in favor of the president, vice president and secretary of the said society, for such sums of money, not exceeding \$15,000 in all, and not exceeding \$5,000 in any one year, as he shall judge proper, to be expended by the said society for the purposes aforesaid: Provided however, That the manner of making such location and survey shall be first submitted to the Governor, and by him approved.